

✓ 4,866,614
✓ 4,932,414
✓ 4,141,347
✓ 4,237,901
✓ 3,735,755
✓ 5,555,853

4,911,170 - high frequency ultrasonic imaging catheter

*5,360,399 *6,167,296

604/96.01
600/452,458

What is claimed is:

- 1 1. An apparatus for treating ocular disease comprising:
- 2 a locating means for non-invasively locating Schlemm's Canal in an eye, and
- 3 a microsurgical device coupled with the locating means so as to advance the
- 4 microsurgical device into a tissue space identified with Schlemm's Canal.

column 7
37-40

382,351
351/200
eye
examining or
testing
instrument

382/351

604/22
ultrasound

- ✓ 1 2. The apparatus of claim 1, wherein the microsurgical device is under control by the
- 2 locating means. - CPU

- ✓ 1 3. The apparatus of claim 1, wherein the locating means comprises a device for
- 2 ultrasound examination of the sclera.

- ✓ 1 4. The apparatus of claim 1, wherein the locating means comprises an ultrasound imaging
- 2 system.

- 1 ~~5. The apparatus of claim 1, wherein the locating means comprises a non-imaging~~
- 2 ~~ultrasound detection system.~~

- 1 6. The apparatus of claim 1, wherein the locating means comprises an ultrasound device
- 2 for examination of the sclera with an ultrasound frequency greater than 10 MHz.

3,941,122

- 1 7. The apparatus of claim 1, wherein the locating means comprises an ultrasound device
- 2 for examination of the sclera with an ultrasound frequency of at least 40 MHz.

- ✓ 1 8. The apparatus of claim 3, wherein the locating means utilizes an ultrasound contrast
- 2 tracer introduced into the aqueous humor.

6,132,699

- 1 9. ~~The apparatus of claim 1, wherein the locating means comprises a non-imaging~~
- 2 ~~ultrasound device for examination of the sclera.~~

~~5, 797, 849~~

5,054,492
Summary of
inventions

4,932,414
~~5,989,189~~
5,989,189

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~~14. The apparatus of claim 11, wherein the op device.~~

5. The apparatus of claim 11, wherein the optical isolator is configured to filter out undesirable wavelengths of light.

16. The apparatus of claim 11, wherein the optical filter is configured to filter out infrared wavelengths.

7. The apparatus of claim 11, wherein the optical image is an image of the imaging of a fluorescent tracer in the aqueous humor.

~~6,524,275 claim 6~~
6,198,956
* 6,146,366

1 19. The apparatus of claim 1, wherein a tissue contacting surface of the locating means
2 incorporates a circumferential raised portion to maintain placement of a coupling fluid
3 over a transducer face to aid in energy transfer between the locating means and the tissue
4 surface.

5,984,904
claim 1

1 20. An apparatus for treating ocular disease comprising:
2 a non-invasive locating means for locating Schlemm's Canal in the eye, and
3 a microcannula ¹⁰⁹ coupled with the locating means so as to slidably advance into a
4 tissue space identified with Schlemm's Canal.

- obvious

1 21. The apparatus of claim 20, wherein the microcannula has an outer diameter of less
2 than 200 microns.

1 22. The apparatus of claim 20, wherein the microcannula is coupled to the locating means
2 at an angle between 0 and 30 degrees from the plane of Schlemm's Canal in the eye.

6,203,499

1 23. The apparatus of claim 20, wherein an angle of the microcannula with respect to the
2 locating means is adjustable.

1 24. The apparatus of claim 20, wherein the locating means and the microcannula are
2 disposed within a unitary body.

1 25. The apparatus of claim 20, wherein the microcannula is coupled to the locating means
2 by way of a clip mechanism.

4,883,053

1 26. The apparatus of claim 20, wherein a distal portion of the microcannula is curved to
2 accommodate a curvature of Schlemm's Canal.

5,921,954

1 27. The apparatus of claim 20, wherein the microcannula incorporates a cutting tip to
2 penetrate a sclera of the eye.

5,092,837
5,984,904

3 5,984,904

35,984,904

3 51984,904
"pliable"

35
"pliable"

1 36. The apparatus of claim 32, wherein the dilation mechanism is comprised of an
2 elongate rod having steps of successively increasing diameters.

1 37. The apparatus of claim 32, wherein the microcannula is coupled coaxially with the
2 locating means.

1 38. An apparatus for treating ocular disease comprising:
2 a non-invasive locating means for locating Schlemm's Canal,
3 a microcannula which is linked with the locating means to advance the microcannula
4 into an identified tissue space for Schlemm's Canal, and
5 an implant which is delivered into Schlemm's Canal .

1 39. The apparatus of claim 38, wherein the implant comprises an expandable stent.

} 5957975

1 ~~40. The apparatus of claim 38, wherein the implant comprises microparticles.~~

1 ~~41. The apparatus of claim 38, wherein the implant comprises a drug releasing material.~~

1 42. The apparatus of claim 38, wherein the stent comprises a biodegradable material.

} 5593403

1 ~~43. The apparatus of claim 40, wherein the microparticles comprise a biodegradable~~
2 ~~material.~~

1 ~~44. The apparatus of claim 41, wherein the drug releasing material contains a drug~~
2 ~~effective in the treatment of glaucoma.~~

1 45. An apparatus for treating ocular disease comprising:
2 a non-invasive locating means for locating Schlemm's Canal,
3 a microcannula which is linked with the locating means to advance the microcannula
4 into an identified tissue space for Schlemm's Canal, and

5 a construct which is delivered through the microcannula to effect a surgical procedure
6 on a trabecular meshwork of the eye.

1 46. The apparatus of claim 45, wherein the construct comprises a surgical tool for cutting
2 tissues.

1 47. The apparatus of claim 45, wherein the construct comprises a fiber optic device.

1 48. The apparatus of claim 47, wherein the fiber optic device is an imaging fiber.

1 49. The apparatus of claim 47, wherein the fiber optic device is an illuminating fiber.

1 50. A method for surgically accessing Schlemm's Canal for treating ocular disease,
2 comprising:

3 locating Schlemm's Canal in an eye via non-invasive means;

4 advancing a minimally invasive surgical device into the canal guided by the locating
5 means;

6 delivering a substance for the treatment of the ocular disease.

1 51. The method of claim 50, wherein Schlemm's Canal is located using ultrasound
2 imaging.

1 52. The method of claim 50, wherein Schlemm's Canal is located using optical means.

1 53. The method of claim 50, wherein ultrasound imaging is utilized.

1 54. The method of claim 50, wherein non-imaging ultrasound guidance is utilized.

63. The method of claim 50, wherein the substance comprises a drug releasing substance.

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